

**EPA / DEC SCOPING QUESTIONS FOR GEOTECHNICAL SURVEYING ACTIVITIES ON THE
OUTER CONTINENTAL SHELF AND STATE WATERS IN THE CHUKCHI SEA AND
BEAUFORT SEA**

Please note, answers we provide at this time are preliminary, based on best available information at this point and could be subject to expansion, contraction, change and/or amendment for a variety of reasons in the future, and without advance notice, other than as necessary for future permitting.

- 1) Describe the projected annual geotech program location and goals in the context of infrastructure. See Attached TABLE 1
 - a. Platform location assessment
 - b. Shallow pipeline corridor
 - c. Deep pipeline corridor
 - d. Other (e.g. artificial islands)
- 2) When are geotechnical operations anticipated to occur (per program location / goal per Sea and per year)? See Attached TABLE 1
 - a. Seasonally? If seasonal, identify months of planned operations.
 - b. Open water only?
 - c. Winter or land-fast ice conditions?
- 3) What types of borehole drilling technologies will be used? See Attached TABLE 1
 - a. Conventional rotary drill – The predominant technology intended for use is the conventional rotary drilling.
 - b. Piston corer – Operators do not currently intend to use a piston corer.
 - c. Other (e.g. Seabed Technology) –A seabed technology is not currently anticipated.
- 4) Will drilling fluids be used? (yes, please see the Shell Application for a description of the fluids anticipated to be used, when required. Please note that when drilling on ice, drilling fluids are not anticipated). Is there a mechanism to collect drilling fluids and cuttings? (No) For anticipated drilling methods, describe handling procedures for fluids & cuttings. Cuttings would be discharged to the seafloor at the site of each boring, along with drilling fluids. Drilling fluids are not returned to the sea surface; they exit the borehole at the seafloor at the top of the borehole with the cuttings. Unused drilling fluids will be used at the next borehole, but mixed drilling fluids remaining in the tanks at the end of the investigation / season would be discharged to the sea (see questions re: “mud pits”).

Fluids and mud cuttings will ultimately end up on the seafloor as discharges.

- a.* What are the expected quantities of drilling fluids to be used? See Table 2

Table 2- Projected Volumes and Rates –

Technology	Borehole Diameter	Cuttings and Drilling Fluids Discharged / Borehole by Depth								
		50 ft			200 ft			499 ft		
		Cuttings	Mud	Total	Cuttings	Mud	Total	Cuttings	Mud	Total
Conventional Rotary Drilling on Vessel	7 in	11 ft ³	22 ft ³	33 ft ³	48 ft ³	89 ft ³	137 ft ³	124 ft ³	223 ft ³	347 ft ³
	8 in	15 ft ³	22 ft ³	37 ft ³	64 ft ³	89 ft ³	154 ft ³	165 ft ³	223 ft ³	388 ft ³
	9 in	20 ft ³	23 ft ³	43 ft ³	85 ft ³	89 ft ³	174 ft ³	213 ft ³	223 ft ³	437 ft ³
Con Rot Drilling on Ice	8 in	15 ft ³	--	15 ft ³	65 ft ³	--	65ft ³	166 ft ³	--	166 ft ³

- b.* Stored and disposed of at a permitted land-based location - no
- c.* Surface discharge (mixing zone)
- d.* Seafloor (zone of deposit and/or mixing zone) Fluids and cutting will be discharged at the seafloor from rotary drilling activities.
- 5) If drilling fluids are used, (*a*) what types of fluids will be used and (*b – d*) what would be the anticipated chemical makeup? Shell plans to drill the deep boreholes using seawater, viscosifier, and barite. The gel is expected to be attapulgitic clay (see previous application for additional details regarding the makeup of the drilling fluids).
- a.* Water-based or non-aqueous? Shell intends to use water-based drilling fluids. BPXA may use small amounts of fresh water.
- b.* Viscosifying agent (e.g. a thickener such as clay)? Please see Shell application.
- c.* Densifying agent (e.g. barite)? Please see Shell application.
- d.* Will polymer gels be used to increase lubricating nature of the muds? Please see Shell application.
- 6) What is the expected number of boreholes per program goal per Sea per year? See Attached TABLE 1- note that years 2015 through 2019 describe a variety of boreholes; however, not all of them would be performed in a given year (just a combination of the boreholes described). The scope of work for any given year (total drilled footage) would be similar to that provided for during open water season in 2014 (approximately 5,160 ft. per year).
- a.* Describe the types of borehole(s) intended to be drilled (e.g. diameter, depth, etc.)? See Attached TABLE 1

- b.** Breakdown of Annual Boreholes per Water Depth below MLLW (See attached TABLE 1)
 - i. < 5 m
 - ii. $10 \text{ m} > X > 5 \text{ m}$
 - iii. $20 \text{ m} > X > 10 \text{ m}$
 - iv. $> 20 \text{ m}$
- c.** What is the projected volume of drilling fluids and drill cuttings generated per method and what are the diameter/depth relationships? In general, boreholes are intended to all be drilled with a 9-inch bit or smaller. (See TABLE 2).
- d.** What is the anticipated areal extent of sediment deposition and thickness relative to depths of the holes?

The areal extent is not known at this time as detailed modeling has not been performed to date; however, simple calculations can indicate likely ranges of the seafloor area that might be affected by the deposition of cutting and drilling fluids given the volume of discharged material. The drilling fluids and cuttings are not discharge at the surface or in the water column, they are pushed out of the borehole at the seafloor surface by the pressure of the drilling fluids in the wellbore, and then spread out over the seafloor. The material will not spread evenly across the seafloor, but assuming even distributions with expected reasonable maximum and minimum thicknesses of the deposit the area of seafloor over which cuttings and drilling fluids might be deposited would range from 218-1,747 ft² (Table 3). The morphology of cuttings piles from exploration and production drilling of oil and gas wells has been studied (Dredging Research Ltd. 2002). Slopes of these cuttings pile have ranged from 6°-26°. Given these slopes, cuttings and drilling fluids might be deposited over a seafloor area of 60-167 ft² for a 50 ft borehole and 283-788 ft² (Table 4).

Table 3. Area of seafloor that might be covered with drill cuttings given an assumed even thickness

Average Thickness	Boring Depth					
	50 ft		200 ft		500 ft	
	Radius (ft)	Area (ft ²)	Radius (ft)	Area (ft ²)	Radius (ft)	Area (ft ²)
3.0 in	7.4	170	14.9	696	23.6	1,747
6.0 in	5.2	85	10.5	348	16.7	874
24.0 in	2.6	21	5.3	87	8.3	218

Table 4. Seafloor area that might be covered given a conical shape and reported cuttings pile slopes

Depth (ft)	Vol (ft ³)	Slope of 26°					Slope of 6°				
		Radius (ft)	Diameter (ft)	Height (ft)	Area (ft ²)	Area (ac)	Radius (ft)	Diameter (ft)	Height (ft)	Area (ft ²)	Area (ac)
50	43	4	9	2.1	60	0.001	7	15	0.8	167	0.004
200	174	7	14	3.4	153	0.004	12	23	1.2	426	0.010
500	437	9	19	4.6	283	0.006	16	32	1.7	788	0.018

- e. What is the expected spacing, or range of spacing, between each borehole sample location? Spacing between pipeline borehole locations will vary as the program matures. Initial pipeline spacing could range from 5 to 10 km each; however, as the pipeline route is refined and closer to the time of an EIS, spacing would need to be closer and could range from 0.5 to 1 km each. Other projects in 2014 anticipate spacing of approximately 500 ft between holes and up to ¼ to ½ mile between holes.
- 7) What would be the maximum discharge of drilling fluids and drill cuttings (*max rate of discharge per hour and max discharge per day*)? See Shell application. For other projects, this is not applicable.
- 8) What type of vessel(s) will be used to conduct borehole drilling activities? (See Attached TABLE 1).
 - a. Floating vessel –yes, a vessel likely to conduct drilling activities while in dynamic positioning mode.
 - b. Moored vessel – a moored vessel is unlikely
 - c. Through the ice equipment – Geotechnical drilling from ice in 2014 and possibly more activity likely in 2015 to 2019.
 - d. For some applications this use of a liftboat may be required. A lift boat is a small self-propelled, work over platform capable of transiting to a location and jacking itself out of the water to a height that will allow for safe operations. These vessels are usually employed to do work on existing platforms or at open-water locations where the type of work being performed requires a stable deck. A liftboat usually has three or four legs with jacking houses and lengths that will allow them to work in various water depths ranging from 10 ft to over 200 ft. They are equipped with wide open decks

that allow a variety of operations to be performed. These types of boats are well adapted to the type of geotechnical activities planned in shallow waters from near the coastline (shore approach) out to the 20m water depth contour.

- 9) How long (i.e. days) is a vessel/rig expected to operate at a specific borehole drill site? How many vessels are expected to be utilized per sampling program? (See Attached TABLE 1). A single geotechnical vessel is intended for use in each theatre or a shared geotechnical vessel between theatres. For winter activities in 2014, there may be 1 or 2 borehole drill rigs on site. The anticipated number of days at a drill site is provided in TABLE 1 attached. – the vessel will operate at a shallow site for appx ½ to 1 day each and at a deeper borehole for 1 to 2 days each. Of course, this is highly dependent on weather conditions and seastates encountered while on site.
- 10) What are the anticipated discharges and volumes from the vessel(s)?
- a. Deck drainage
 - b. Domestic wastewater (black water and graywater)
 - c. Desalination wastewater
 - d. Boiler blowdown
 - e. Fire control test water
 - f. Non-contact cooling water
 - g. Uncontaminated ballast water
 - h. Bilge water

The following discharge volumes and rates were provided in Shell's NPDES Geotechnical application sent to EPA and ADEC in April 2013. BPXA will not discharge any of the above; domestic wastewater will be transported to Wastewater Treatment Facilities.

- 11) Will chemicals/additives be added to any other vessel/rig discharges (i.e. discharges other than drilling fluids and drill cuttings)?
- a. Noncontact cooling water? The use of chemicals in non-contact cooling water will depend on the specific vessel system. Some vessels do not use a chemical additive for the non-contact cooling water. If a chemical additive is used, a common biological growth treatment is Amersperse 28.
 - b. Disinfection of sanitary/domestic wastes, etc.. The use of chemicals in sanitary and domestic waste will depend on the type of marine sanitation device that the vessel is using. A common chemical additive to this system is chlorine.

Until vessel contracts are made, we do not have the specifics on the types of chemical additives that will be used while performing geotechnical activities.

- 12) What is the maximum discharge of noncontact cooling water (*max rate of discharge per hour and max discharge per day*)? The maximum rate of non-contact cooling water will depend on the vessel contracted for the work. Shell provided an estimate of the maximum discharge rate in the applications submitted to EPA and ADEC.

- 13)** What is a “mud pit” and what is “mud pit clean up”? (*Source: Shell NPDES Permit Application Form 2C*) A “mud pit” is the location where the drilling fluids (mud) is mixed prior to use in drilling operations. This material is generally discharged following the drilling of the last geotechnical well and the “mud pit” is rinsed with either potable or seawater.

Most geotech mud pits are either round or square open-top steel containers that hold from 800 gal to 1,600 gal apiece. They are fitted on top with a mud agitator to keep the solids (drill additives) from settling. The pumps are usually connected to a Gardner-Denver 4X6 or 5X7 diesel-driven mud pump with 3-inch high-pressure hosing. The mud pump is connected to the drill rig with the same hosing. The mud pump pumps the mud up the rig’s standpipe where it is delivered to the drilling swivel and pumped to the bottom of the borehole through the boats moon-pool via the drill pipe. Mud pits will likely be cleaned at the end of the season, or if solids become a problem, by filling with seawater, agitating, and pumping the mix overboard with the same system. Occasionally the solids that settle and accumulate at the bottom of the pits over the course of many boreholes must be cleaned out by a person with a shovel)

- 14)** Should the ODCE evaluate the same 13 wastestreams as those authorized in the 2012 Exploration General Permits? Are there other wastestreams, not listed below, that should be included in the analysis?

- ☐ *Discharge 001* – water-based drilling fluids and drill cuttings (No, a riser is not installed for geotechnical activities and there is no way to bring this material to the surface. Muds and cutting to be discharged during geotechnical activities should be permitted as D013.)
- ☐ *Discharge 002* – deck drainage
- ☐ *Discharge 003* – sanitary wastes
- ☐ *Discharge 004* – domestic waste
- ☐ *Discharge 005* – desalination unit wastes
- ☐ *Discharge 006* – blowout preventer fluid (No, a BOP is not necessary for geotechnical activities and therefore Bop fluid will not need to be discharged).
- ☐ *Discharge 007* – boiler blowdown
- ☐ *Discharge 008* – fire control system test water
- ☐ *Discharge 009* – non-contact cooling water
- ☐ *Discharge 010* – uncontaminated ballast water
- ☐ *Discharge 011* – bilge water
- ☐ *Discharge 012* – excess cement slurry
- ☐ *Discharge 013* – muds, cuttings and cement at the seafloor

- 15)** Will any of the boreholes be “plugged?” If so, what materials will be used? – As general practice we do not anticipate plugging the boreholes. In the unlikely event that the substrate conditions warrant the borehole to be “plugged, “ a heavy cement-

bentonite slurry would be used. We would like to retain the ability to discharge cement should the rare occasion arise.

- a.* Excess cement slurry? – Yes, see above.
- b.* Other? -no

- 16) Will trenching technologies be evaluated or trenching activities conducted within the next 5 years? If so, EPA/DEC would like more information on this activity in order to include it in this permit development process. Please consider the following: potential location, time of year, method/technology, and disposal/displacement of removed sediments.

At this time, Shell does not intend on testing trenching equipment within the 5 year prevue of this general permit. Shell will need to perform these activities as more information is gathered from the geotechnical borings. BPXA trenching may occur within the next 5 years. BPXA plans to perform trenching during the winter, through the ice, with sediments being placed back into the trench.

- 17) Can we expect future development and production operators to share the same infrastructure, such as a joint pipeline system? What other potential pipeline routes should we consider in our analysis? It is not known at this time if infrastructure will be shared among operators.

Potential pipeline routes that Shell could evaluate in the 5 year period would be from any of the Shell lease holdings to shore.

- 18) At any point during the geotechnical program activities, will vessels conducting the bore-hole drilling operations be shared by multiple operators? It is not known at this time whether geotechnical vessel resources would be shared between operators.

- 19) We would like more information regarding potential geotechnical activities occurring within the 25 mile deferral area in the Chukchi Sea. What are the anticipated activities and how would industry ensure minimal impacts on biological communities within this area?

Activities: Approximately 10 geotechnical borings could be conducted in Federal waters within the lease deferral area 3-25 mi from the shoreline. The Federal waters lease deferral borings are expected to be shallow (< 50 ft) borings to investigate the physical properties of the sediments along potential pipeline routes. Rotary drilling systems will be used to conduct the borings from vessels. Drilling fluids may be utilized. Each geotechnical boring may take about 24 hrs to complete. Used drilling fluids will be discharged to the seafloor as they exit the borehole.

Minimization: Oil and gas operators must obtain an authorization or approval from the Bureau of Ocean Energy Management (BOEM) in the form of a Geological & Geophysical (G&G) authorization or Ancillary Activities (AA) approval before conducting a geotechnical program in the Outer Continental Shelf (OCS), and meet

BOEM's Lease Stipulations. They must also obtain an Incidental Harassment Authorization (IHA) from the National Marine Fisheries Service (NMFS) and a Letter of Authorization (LOA) from the U.S. Fish and Wildlife Service (USFWS) for potential takes of marine mammals under the Marine Mammal Protection Act (MMPA). Each of these authorizations has associated mitigation requirements that are aimed at minimizing any effects on biological communities and subsistence activities. Each of these authorizations has associated mitigation requirements that are aimed at minimizing any effects on biological communities and subsistence activities. Mitigation measures as stipulations of other permits and authorizations generally included altitude flight restrictions, vessel speeds, marine mammal monitoring, and avoidance of areas such as Ledyard Bay Critical Habitat Unit. Shell performs a variety of mitigation measures geared toward avoidance of impacts to subsistence activities. These measures often arise in private-party agreements with local stakeholders. These mitigation measures may vary from year-to-year given the level and location of activities and should not be included as an NPDES permit stipulation and should be continued to be worked between Shell and the stakeholders. These measures generally include establishment of Communication Centers (Com Center), execution of Communication Plans, employment of subsistence advisors, community liaison officers, and Com Center personnel to ensure that subsistence activities are not impacted.

- 20) Please describe the community outreach activities conducted thus far by industry, or those activities to be completed in the near future, regarding planned geotechnical work.**

Shell went out to all the NSB communities in October 2012 and discussed a potential geotech program for 2013. The work was proposed for the Beaufort Sea to be done in late July till mid August (prior to the whaling black out date) and for the Chukchi during the open water season. Shell presented maps and descriptions of the rig and equipment. Shell went to all the communities except for Point Hope. Shell will likely go back out in October/November of this year and discuss geotechnical activities planned for 2014. BPXA does not plan to perform public outreach for geotechnical work.

- 21) Are there other geotechnical activities industry is aware of that may occur within the next five years, and which may or may not be conducted to support oil and gas activities? Mooring analyses may be required for a variety of different scenarios. It is possible that geotechnical borings may be required to support these efforts.**

- 22) Additional Issues/Information/Concerns:**

- ☐ AOGA appreciates EPA and ADEC's commitment to ensuring geotechnical permit coverage for activities to be conducted in July 2014. AOGA is concerned with the tight timeline between permit issuance and when work would need to be conducted during the open water season. AOGA requests that the agencies consider the time required of applicants to prepare and file an NOI, as well as the time necessary for the agency to review that NOI and provide the requisite

coverage for a short open water season, when it considers the timing around ultimate permit issuance.

- Consistent with the concern expressed above, and the currently estimated permit issuance date, Shell is concerned with timing requirements around ancillary commitments it needs to make to conduct geotechnical activities in 2014. With EPA's current schedule proposed for this permit, Shell would have to make significant financial commitments to procure vessels, contractors, and equipment well in advance of a final permit being issued. The lack of permit certainty currently estimated to be well into 2014, versus the commercial obligations that companies will have to make in that space, is concerning.
- EMP requirements issued in the new exploration general permit should not be mandated as part of this program. The currently estimated discharge volumes, and correspondingly anticipated de minimus impacts, are not thought to be of the same magnitude as an exploration program in order to merit such requirements.
- AOGA recommends that coverage to perform geotechnical activities should be provided in a manner to provide flexibility to perform specified activities within an "area" - i.e. not requiring specificity in designating locations as part of the application, or corresponding authority. Discretion is needed in the field as to where the next borehole should be drilled based on real time data collected at that time.
- AOGA requests that the agency provide a mechanism in order to provide for confidentiality of geotechnical boring locations if they are determined by the applicant to require such protection due to business, proprietary or other similar reasons (i.e. potentially associated with proprietary pipeline location, etc.)
- Clarity should be provided on when this permit is applicable to the geotechnical vessel. It is suggested that applicability of the geotechnical permit should only be when in Dynamic Positioning mode or anchored; not when moving between geotech locations. This is to avoid potential conflict with other regulations, i.e. the movement of the vessel between locations should continue to be regulated under MARPOL and/or the vessel general permit (depending on location).

Table 1 – Projected Program Goals - Note that the data presented for the 2014 program represent a full open water season; the data for 2015-2019 reflect the different types of work undertaken in any given year. The scope of work for any given year (total drilled footage) would be similar to that provided for during open water season in 2014.

2014

Program Goal	Technology	depth of borehole	water depth below MLLW	Borehole Diameter	Number of boreholes	Season/Timing Performed	Location (Sea)	State or Federal Waters	Anticipated Duration Per Borehole
Pipeline	Rotary DP	<50 feet deep	20 to 45 m	9"	20 to 24	Open Water	Chukchi/Beaufort	Federal	up to 1 day
Platform	Rotary DP	>50 feet and < 499 feet	40 to 45 m	9"	3 to 8	Open Water	Chukchi/Beaufort	Federal	up to 3 days
Other	Rotary on Ice	>50 feet and < 499 feet	<5 to <10 m	6.5"	50	Winter	Chukchi/Beaufort	State/ Federal	up to 1 day
NOT APPLICABLE		>499 feet							

2015

Program Goal	Technology	depth of borehole	water depth below MLLW	Borehole Diameter	Number of boreholes	Season/Timing Performed	Location (Sea)	State or Federal Waters	Anticipated Duration Per Borehole
Pipeline	Rotary DP	<50 feet deep	20 to 45 m	9"	20 to 24	Open Water	Chukchi/Beaufort	Federal	up to 1 day
Platform	Rotary DP	>50 feet and < 499 feet	40 to 45 m	9"	3 to 6	Open Water	Chukchi/Beaufort	Federal	up to 3 days
Pipeline	Rotary Liftboat	<50 feet deep	4 to 20 m	9"	up to 40	Open Water	Chukchi/Beaufort	State	up to 1 day
Pipeline	Rotary Liftboat	<200 feet	4 to 20 m	9"	up to 10	Open Water	Chukchi/Beaufort	State	1 to 2 days
Pipeline	Rotary DP	<200 feet	40 to 45 m	9"	up to 10	Open Water	Chukchi/Beaufort	Federal	1 to 2 days
Pipeline	Rotary on ice	<50 feet deep	<20 m	8"	up to 40	Winter	Chukchi/Beaufort	State	less than 1 day
Pipeline	Rotary on ice	>50 feet and < 499 feet	<20 m	8"	up to 40	Winter	Chukchi/Beaufort	State	1 day or more
NOT APPLICABLE		>499 feet							

2016

Program Goal	Technology	depth of borehole	water depth below MLLW	Borehole Diameter	Number of boreholes	Season/Timing Performed	Location (Sea)	State or Federal Waters	Anticipated Duration Per Borehole
Pipeline	Rotary DP	<50 feet deep	20 to 45 m	9"	20 to 24	Open Water	Chukchi/Beaufort	Federal	up to 1 day
Platform	Rotary DP	>50 feet and < 499 feet	40 to 45 m	9"	3 to 6	Open Water	Chukchi/Beaufort	Federal	up to 3 days
Pipeline	Rotary Liftboat	<50 feet deep	4 to 20 m	9"	up to 40	Open Water	Chukchi/Beaufort	State	up to 1 day
Pipeline	Rotary Liftboat	<200 feet	4 to 20 m	9"	up to 10	Open Water	Chukchi/Beaufort	State	1 to 2 days
Pipeline	Rotary DP	<200 feet	40 to 45 m	9"	up to 10	Open Water	Chukchi/Beaufort	Federal	1 to 2 days
Pipeline	Rotary on ice	<50 feet deep	<20 m	8"	up to 40	Winter	Chukchi/Beaufort	State	less than 1 day
Pipeline	Rotary on ice	>50 feet and < 499 feet	<20 m	8"	up to 40	Winter	Chukchi/Beaufort	State	1 day or more
NOT APPLICABLE		>499 feet							

2017

Program Goal	Technology	depth of borehole	water depth below MLLW	Borehole Diameter	Number of boreholes	Season/Timing Performed	Location (Sea)	State or Federal Waters	Anticipated Duration Per Borehole
Pipeline	Rotary DP	<50 feet deep	20 to 45 m	9"	20 to 24	Open Water	Chukchi/Beaufort	Federal	up to 1 day
Platform	Rotary DP	>50 feet and < 499 feet	40 to 45 m	9"	3 to 6	Open Water	Chukchi/Beaufort	Federal	up to 3 days
Pipeline	Rotary Liftboat	<50 feet deep	4 to 20 m	9"	up to 40	Open Water	Chukchi/Beaufort	State	up to 1 day
Pipeline	Rotary Liftboat	<200 feet	4 to 20 m	9"	up to 10	Open Water	Chukchi/Beaufort	State	1 to 2 days
Pipeline	Rotary DP	<200 feet	40 to 45 m	9"	up to 10	Open Water	Chukchi/Beaufort	Federal	1 to 2 days
Pipeline	Rotary on ice	<50 feet deep	<20 m	8"	up to 40	Q1/Q2	Chukchi/Beaufort	State	less than 1 day
Pipeline	Rotary on ice	>50 feet and < 499 feet	<20 m	8"	up to 40	Q1/Q2	Chukchi/Beaufort	State	1 day or more
NOT APPLICABLE		>499 feet							

2018

Program Goal	Technology	depth of borehole	water depth below MLLW	Borehole Diameter	Number of boreholes	Season/Timing Performed	Location (Sea)	State or Federal Waters	Anticipated Duration Per Borehole
Pipeline	Rotary DP	<50 feet deep	20 to 45 m	9"	20 to 24	Open Water	Chukchi/Beaufort	Federal	up to 1 day
Platform	Rotary DP	>50 feet and < 499 feet	40 to 45 m	9"	3 to 6	Open Water	Chukchi/Beaufort	Federal	up to 3 days
Pipeline	Rotary Liftboat	<50 feet deep	4 to 20 m	9"	up to 40	Open Water	Chukchi/Beaufort	State	up to 1 day
Pipeline	Rotary Liftboat	<200 feet	4 to 20 m	9"	up to 10	Open Water	Chukchi/Beaufort	State	1 to 2 days
Pipeline	Rotary DP	<200 feet	40 to 45 m	9"	up to 10	Open Water	Chukchi/Beaufort	Federal	1 to 2 days
Pipeline	Rotary on ice	<50 feet deep	<20 m	8"	up to 40	Q1/Q2	Chukchi/Beaufort	State	less than 1 day
Pipeline	Rotary on ice	>50 feet and < 499 feet	<20 m	8"	up to 40	Q1/Q2	Chukchi/Beaufort	State	1 day or more
NOT APPLICABLE		>499 feet							

2019

Program Goal	Technology	depth of borehole	water depth below MLLW	Borehole Diameter	Number of boreholes	Season/Timing Performed	Location (Sea)	State or Federal Waters	Anticipated Duration Per Borehole
Pipeline	Rotary DP	<50 feet deep	20 to 45 m	9"	20 to 24	Open Water	Chukchi/Beaufort	Federal	up to 1 day
Platform	Rotary DP	>50 feet and < 499 feet	40 to 45 m	9"	3 to 6	Open Water	Chukchi/Beaufort	Federal	up to 3 days
Pipeline	Rotary Liftboat	<50 feet deep	4 to 20 m	9"	up to 40	Open Water	Chukchi/Beaufort	State	up to 1 day
Pipeline	Rotary Liftboat	<200 feet	4 to 20 m	9"	up to 10	Open Water	Chukchi/Beaufort	State	1/2 to 1 day
Pipeline	Rotary DP	<200 feet	40 to 45 m	9"	up to 10	Open Water	Chukchi/Beaufort	Federal	1/2 to 1 day
Pipeline	Rotary on ice	<50 feet deep	<20 m	8"	up to 40	Q1/Q2	Chukchi/Beaufort	State	less than 1 day
Pipeline	Rotary on ice	>50 feet and < 499 feet	<20 m	8"	up to 40	Q1/Q2	Chukchi/Beaufort	State	1 day or more
NOT APPLICABLE		>499 feet							